REMARKS

This application has been carefully reviewed in light of the Office Action dated February 27, 2001. Applicant has amended claims 1, 9, 16, 20, 22, 24, 26, 27, and 29 - 32. Reconsideration and favorable action in this case are respectfully requested.

The Examiner has rejected claims 1-2, 5-9, 12-15 and 26 under 35 U.S.C. §102(e) as being unpatentable over U.S. Pat. No. 5,907,188 to Nakajima et al. Applicant has reviewed this reference in detail and does not believe that it discloses or makes obvious the invention as claimed.

The Examiner has also rejected claims 20, 21, 23, 27-28 and 29-32 under 35 U.S.C. §103(a) as being unpatentable over Nakajima et al. Claims 16, 24 and 25 stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Pat. No. 5,352,620 to Komori et al in view of Nakajima et al. Claim 19 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Komori et al in view of Nakajima et al and further in view of Wolf, "Silicon Processing for the VSLI Era." Applicant has reviewed these references in detail and does not believe that they disclose or make obvious the invention as claimed.

Claims 29-32 have been amended to correct a typographical error.

Applicant has reviewed the Nakajima reference in detail, in particular the portions cited by the Examiner. It is still Applicant's contention that Nakajima is directed to a different process and does not show the important features of Applicant's invention directed to using a explosive reaction during processing and containing the explosive nature of the reaction.

The Nakajima reference is directed to *avoiding* an explosive reaction. By setting the H_2 to a 4% partial pressure, explosive reactions are avoided, even if there is a *mistake* that causes the H_2 to react with O_2. This is explicitly stated in Nakajima in column 6,

lines 49-55, "...since the partial pressure of the H_2 gas can be set to low pressure (low concentration) *lower than the explosion limit*, the H_2 gas *can be treated in the same manner as an inert gas*" [emphasis added]. The "pressure" is the partial pressure of the H_2, not the pressure within the processing equipment.

Claims 1, 9, 16 and 26 have been amended to specify that the reaction between H_2 and O_2 is an explosive reaction. Claim 26 has also added NO as a possible oxygen-containing gas, as described on page 11 of the present specification. The process is designed such that the explosive reaction between said O_2 and H_2 does not increase the pressure in the processing chamber beyond a predetermined level. Claim 26 has been similarly amended although the reacting gases include an oxygen-containing gas selected from the group consisting of O_2, N_2O, NO or CO_2 and a separate hydrogen-containing gas. As described above, Nakajima does not show a process using an explosive reaction. This aspect of the invention is neither disclosed nor suggested in the any of the cited references.

Dependent claims 20, 22, 24 and 27 describe a specific method for maintaining pressure below a predetermined level. Namely, the O_2 and H_2 are introduced in a portion of a process chamber's total volume, such that the reaction between O_2 and H_2 occurs continuously as the O_2 and H_2 enter the chamber.

The Examiner states that "[i]t would have been within the scope of one of ordinary skill in the art. Applicant respectfully disagrees. By continuously reacting H_2 and O_2, as the gases enter the chamber, the explosiveness of the reaction at any given time is minimized, while providing the favorable aspects of using the two gases. This method is not suggested in any of the references provided by the Examiner, even though it appears that Nakajima knew of the benefits of using H_2 and O_2.

Claims 21, 23, 25 and 28 describe an additional alternative method of maintaining the pressure of the chamber below a predetermined level. In this case, the O_2 (or oxygen containing gas) and H_2 (or hydrogen containing gas) are introduced in a predetermined ratio, and the concentration of one of the gases is increased after the reaction begins. This technique can be used to minimize the shock of the reaction to the chamber. Once again, the Examiner claims that this method would be in the scope of one of ordinary skill in the art. However, no reference is cited. As with the aforementioned claims, this aspect of the invention allows the benefits of using an explosive combination of gases, while protecting the chamber from the shock of the explosion. This is an important method for obtaining the benefits of H_2 and O_2, without damaging equipment. Hence, Applicant does not believe it would be obvious, since none of the references cited by the Examiner suggest such a method.

An extension of one month is requested and a Request for Extension of Time under § 1.136 with the appropriate fee is attached hereto.

The Commissioner is hereby authorized to charge any fees or credit any overpayment, including extension fees, to Deposit Account No. 01-1615 of Anderson, Levine & Lintel, L.L.P.

Applicants have made a diligent effort to place the claims in condition for allowance. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone Alan W. Lintel, Applicants' Attorney at (972) 664-9595 so that such issues may be resolved as expeditiously as possible.

For these reasons, and in view of the above amendments, this application is now considered to be in condition for allowance and such action is earnestly solicited.

Respectfully Submitted,

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Version with marking to show changes made:

1 (Thrice Amended). A method of fabricating, in a semiconductor processing chamber, an electrical device formed in a semiconductor substrate, said method comprising:

forming an insulating layer over said semiconductor substrate;

forming a silicon-containing structure on said insulating layer;

forming a conductive structure on said silicon-containing structure; and

oxidizing a portion of said insulating layer and said silicon-containing structure while leaving said conductive structure substantially unoxidized by introducing O_2 and H_2 in an explosive reaction to said insulating layer, said silicon-containing structure and said conductive structure, such that the reaction between said O_2 and H_2 does not increase the pressure in the processing chamber beyond a predetermined level.

9 (Thrice Amended). A method of oxidizing, in a semiconductor processing chamber, a first feature while leaving a second feature substantially unoxidized, said method comprised of subjecting said first and second features to O_2 and H_2 in an explosive reaction, such that the reaction between said O_2 and H_2 does not increase the pressure in the processing chamber beyond a predetermined level.

16 (Thrice Amended). A method of fabricating, in a semiconductor processing chamber, a capacitor having a dielectric between a bottom electrode and a top electrode and situated over a semiconductor substrate, said method comprising the steps of:

providing said bottom electrode over said semiconductor substrate;

providing a dielectric material over said bottom electrode; and

subjecting said bottom electrode and said dielectric material to O_2 and H_2 in an explosive reaction, wherein said dielectric material is oxidized and said bottom electrode remains substantially unoxidized, such that the reaction between said O_2 and

H_2 does not increase the pressure in the processing chamber beyond a predetermined level.

20 (Twice Amended). The method of claim 1 wherein said oxidizing step comprises the step of oxidizing a portion of said insulating layer and said silicon-containing structure while leaving said conductive structure substantially unoxidized by introducing O_2 and H_2 in an explosive reaction in a portion of a process chamber's total volume, such that reaction between the O_2 and H_2 occurs continuously as the O_2 and H_2 enter the chamber.

22 (Twice Amended). The method of claim 9 and further comprising the step of introducing O_2 and H_2 in an explosive reaction in a portion of a process chamber's total volume, such that reaction between the O_2 and H_2 occurs continuously as the O_2 and H_2 enter the chamber.

24 (Twice Amended). The method of claim 16 and further comprising the step of introducing O_2 and H_2 in an explosive reaction in a portion of a process chamber's total volume, such that reaction between the O_2 and H_2 occurs continuously as the O_2 and H_2 enter the chamber.

26 (Twice Amended). A method of fabricating an electrical device formed in a semiconductor substrate, said method comprising:

forming an insulating layer over said semiconductor substrate;

forming a silicon-containing structure on said insulating layer;

forming a conductive structure on said silicon-containing structure; and

oxidizing a portion of said insulating layer and said silicon-containing structure while leaving said conductive structure substantially unoxidized by introducing an oxygen-containing gas selected from the group consisting of O_2, N_2O, NO or CO_2 and a separate hydrogen-containing gas to said insulating layer, said silicon-containing structure and said conductive structure, such that [the] an explosive reaction between

said [O_2 and H_2] the hydrogen-containing gas and the oxygen containing gas does not increase the pressure in the processing chamber beyond a predetermined level.

27 (Twice Amended). The method of claim 26 wherein said oxidizing step comprises the step of oxidizing a portion of said insulating layer and said silicon-containing structure while leaving said conductive structure substantially unoxidized by introducing said oxygen-containing gas and said hydrogen containing gas in a portion of a process chamber's total volume, such that an explosive reaction between the [O_2 and H_2] the hydrogen-containing gas and the oxygen containing gas occurs continuously as the [O_2 and H_2] the hydrogen-containing gas and the oxygen containing gas enter the chamber.

29 (Amended). The method of claim 1 wherein said oxidizing step comprises the step of oxidizing a portion of said insulating layer and said silicon-containing structure while leaving said conductive structure substantially unoxidized by introducing O_2 and H_2 while the chamber is at a low pressure and increasing the pressure [one] once the reaction begins.

30 (Amended). The method of claim 9 and further comprising the step of introducing O_2 and H_2 while the chamber is at a low pressure and increasing the pressure [one] once the reaction begins.

31 (Amended). The method of claim 16 and further comprising the step of introducing O_2 and H_2 while the chamber is at a low pressure and increasing the pressure [one] once the reaction begins.

32 (Amended). The method of claim 26 wherein said oxidizing step comprises the step of oxidizing a portion of said insulating layer and said silicon-containing structure while leaving said conductive structure substantially unoxidized by introducing said oxygen-containing gas and said hydrogen containing gas while the chamber is at a low pressure and increasing the pressure [one] once the reaction begins.